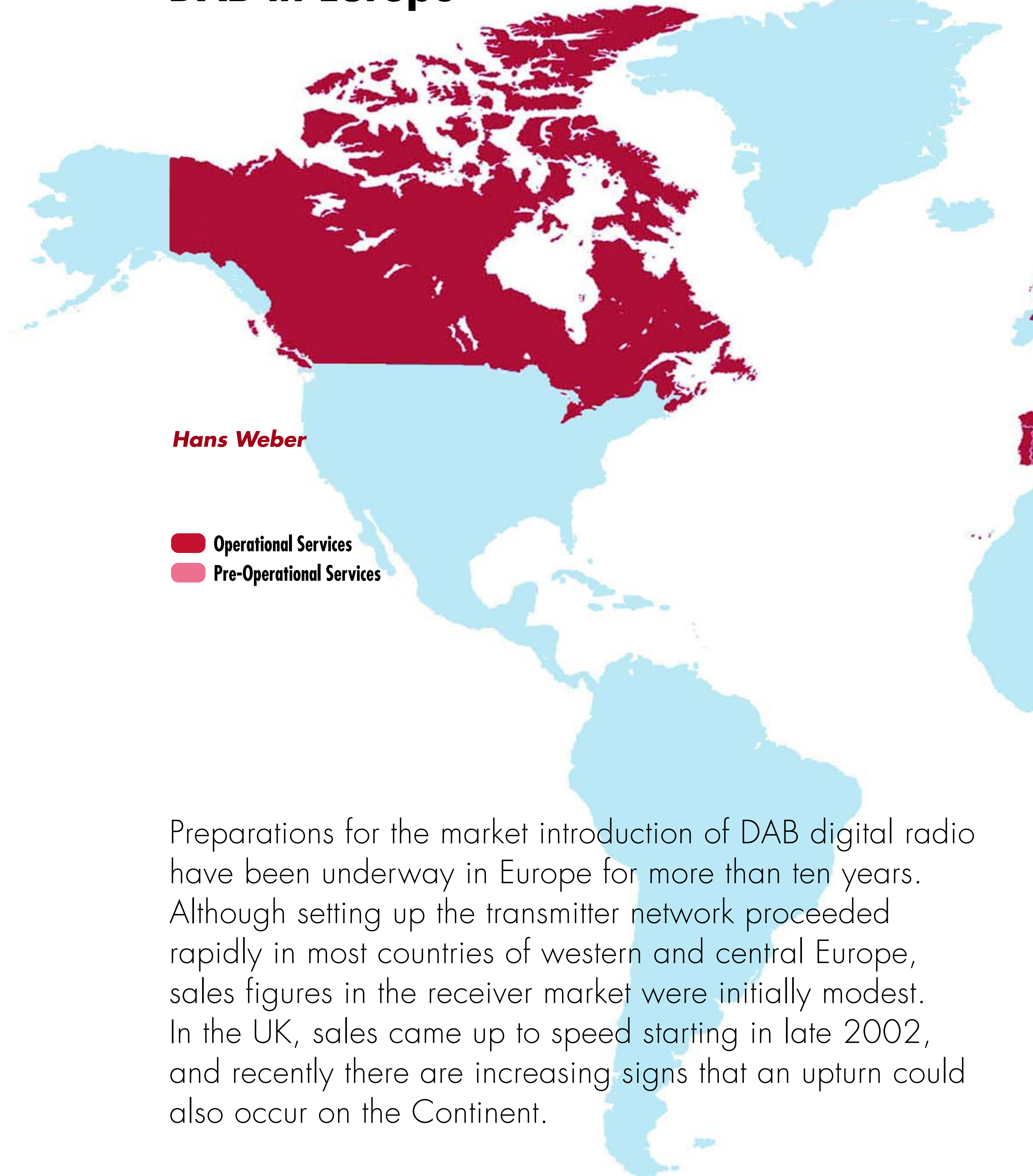
TEN YEARS AFTER

DAB in Europe

Hans Weber



Preparations for the market introduction of DAB digital radio have been underway in Europe for more than ten years. Although setting up the transmitter network proceeded rapidly in most countries of western and central Europe, sales figures in the receiver market were initially modest. In the UK, sales came up to speed starting in late 2002, and recently there are increasing signs that an upturn could also occur on the Continent.

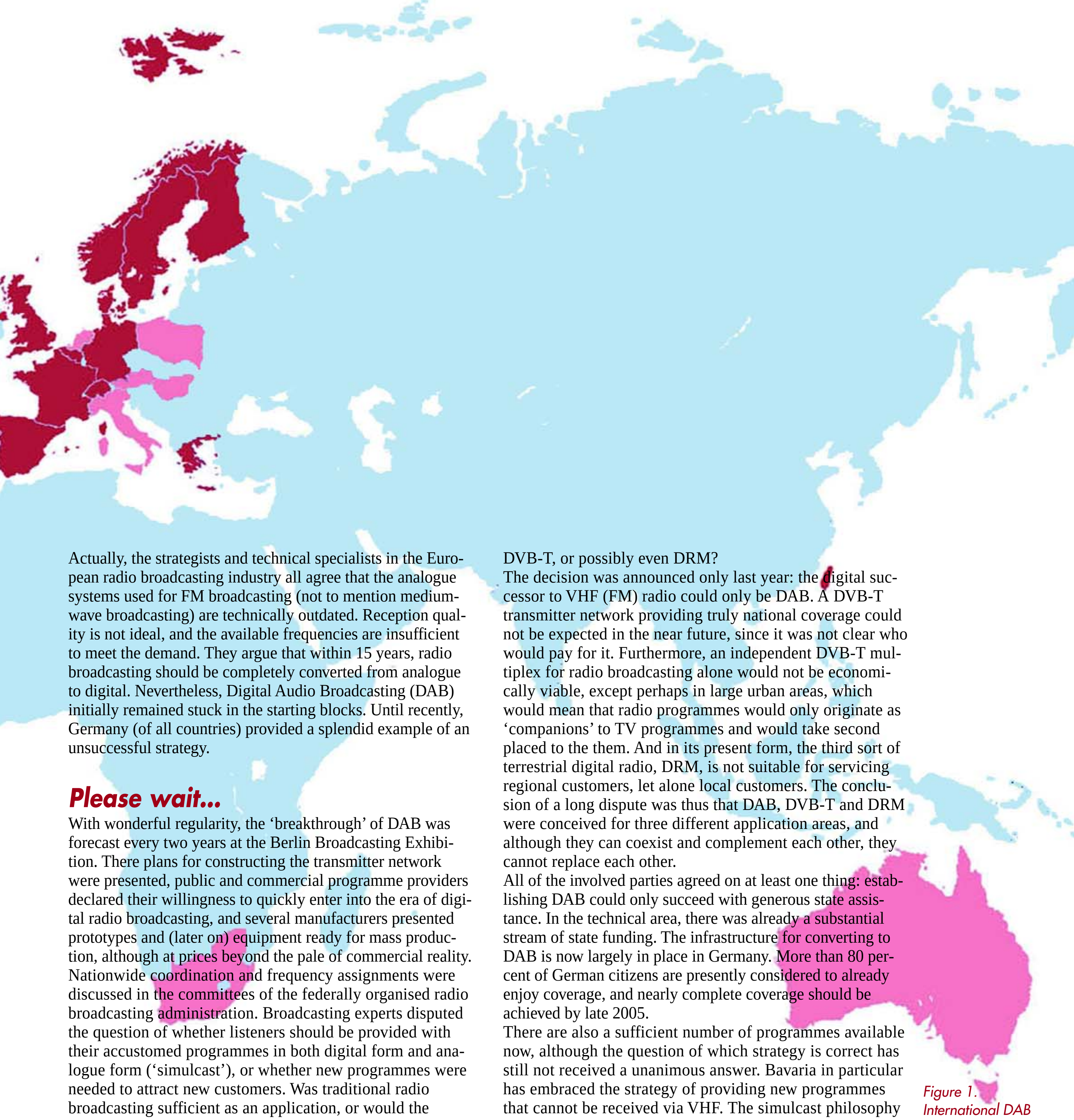


Figure 1. International DAB broadcasting (source: World DAB Forum).

Actually, the strategists and technical specialists in the European radio broadcasting industry all agree that the analogue systems used for FM broadcasting (not to mention medium-wave broadcasting) are technically outdated. Reception quality is not ideal, and the available frequencies are insufficient to meet the demand. They argue that within 15 years, radio broadcasting should be completely converted from analogue to digital. Nevertheless, Digital Audio Broadcasting (DAB) initially remained stuck in the starting blocks. Until recently, Germany (of all countries) provided a splendid example of an unsuccessful strategy.

Please wait...

With wonderful regularity, the ‘breakthrough’ of DAB was forecast every two years at the Berlin Broadcasting Exhibition. There plans for constructing the transmitter network were presented, public and commercial programme providers declared their willingness to quickly enter into the era of digital radio broadcasting, and several manufacturers presented prototypes and (later on) equipment ready for mass production, although at prices beyond the pale of commercial reality. Nationwide coordination and frequency assignments were discussed in the committees of the federally organised radio broadcasting administration. Broadcasting experts disputed the question of whether listeners should be provided with their accustomed programmes in both digital form and analogue form (‘simulcast’), or whether new programmes were needed to attract new customers. Was traditional radio broadcasting sufficient as an application, or would the breakthrough only come with additional data services? On top of this came the great ‘religious war’: was it to be DAB, DVB-T, or possibly even DRM?

The decision was announced only last year: the digital successor to VHF (FM) radio could only be DAB. A DVB-T transmitter network providing truly national coverage could not be expected in the near future, since it was not clear who would pay for it. Furthermore, an independent DVB-T multiplex for radio broadcasting alone would not be economically viable, except perhaps in large urban areas, which would mean that radio programmes would only originate as ‘companions’ to TV programmes and would take second placed to the them. And in its present form, the third sort of terrestrial digital radio, DRM, is not suitable for servicing regional customers, let alone local customers. The conclusion of a long dispute was thus that DAB, DVB-T and DRM were conceived for three different application areas, and although they can coexist and complement each other, they cannot replace each other.

All of the involved parties agreed on at least one thing: establishing DAB could only succeed with generous state assistance. In the technical area, there was already a substantial stream of state funding. The infrastructure for converting to DAB is now largely in place in Germany. More than 80 percent of German citizens are presently considered to already enjoy coverage, and nearly complete coverage should be achieved by late 2005.

There are also a sufficient number of programmes available now, although the question of which strategy is correct has still not received a unanimous answer. Bavaria in particular has embraced the strategy of providing new programmes that cannot be received via VHF. The simulcast philosophy still prevails in many other German states, primarily for cost reasons.

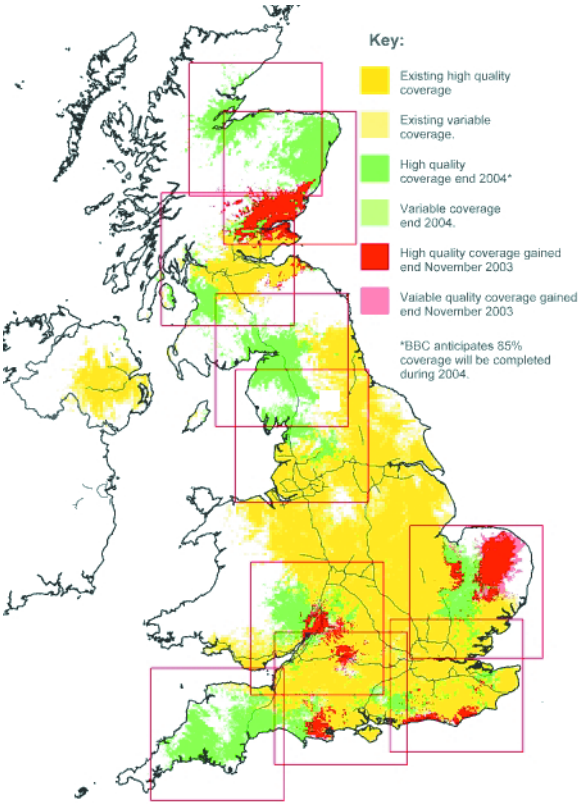

Key:
Existing high quality coverage
Existing variable coverage.
High quality coverage end 2004*
Variable coverage end 2004.
High quality coverage gained end November 2003
Vaiable quality coverage gained end November 2003
*BBC anticipates 85% coverage will be completed during 2004.

Figure 2. DAB coverage in the UK.

Consumers have apparently not gained very much from all of this: the number of receivers sold up to now is estimated to be around 100,000. That is presumably because there is not yet sufficient awareness of the product. Most Germans regard DAB as a brand of beer, and the trademark currently being used, 'Digital Radio', does not provide adequate differentiation from other types of digital radio broadcasting. As the marketing organisations to be found in almost all of the German states explain, 'First we invested a lot of money in the technology, and now we have to invest even more in promotion'. Success will still take a while.

The 99-quid radio

The situation in Great Britain is quite different. Here the market started to move in late 2002. It was recognised that the only way to achieve widespread market penetration of DAB receivers was via the price. The 'magic boundary' was considered to be a receiver under the 100-pound level. The initiative for producing a '99-quid kitchen radio' did not come from the manufacturers or a similar group, but instead from the programme providers. The BBC and commercial broadcasters, in particular Digital One, provides funding for developing an IC named 'Chorus'. The manufacturing cost of this IC was so low that the receiver price could be brought below the magic boundary, although at first this was only possible with additional subsidies. Shortly before Christmas 2002, the Pure Digital Evoke-1 went on sale in selected shops following an extensive advertising campaign, and it was sold out after only a few hours. This 'initial spark' encouraged other manufacturers to join the competition with attractively priced offerings. Not only did this drive down prices (presently, the cheapest receiver costs around 70 pounds, equivalent to 105 euros), it also increased awareness and attracted other customers who were willing to pay somewhat higher prices.

The number of DAB receivers sold in the UK has risen from approximately 50,000 in mid-2002 to the present figure of more than half a million — and that with a degree of coverage originally comparable to that in Germany, and now even somewhat lower.

Of course, the initial situation in Great Britain was also different. Medium-wave broadcasting is much more common here than elsewhere, so the difference in reception quality is more evident than with FM broadcasting. In addition, greater emphasis was placed on 'new' programmes (which cannot be received using analogue receivers), and they were promoted in the media.

Another advantage relative to Germany is that in the UK, DAB is available in only one frequency band (Band III, 174–240 MHz). In Germany, DAB is also transmitted in the L band (1452–1492 MHz), which unfortunately increases costs and reduces transmitter range.

West Europe: a varied situation

Nearly complete coverage has been established in Belgium, which has the highest level of coverage (95 %) in all of Europe.

In France, the focus was on large metropolitan areas from the very beginning. DAB programming is available in Paris, Lyon, Marseille, Toulouse and Nantes, and in total 25 to 30 percent of the population can be reached. In the Nether-

Figure 3. The Restek EDAB high-end DAB tuner (www.restek.de).

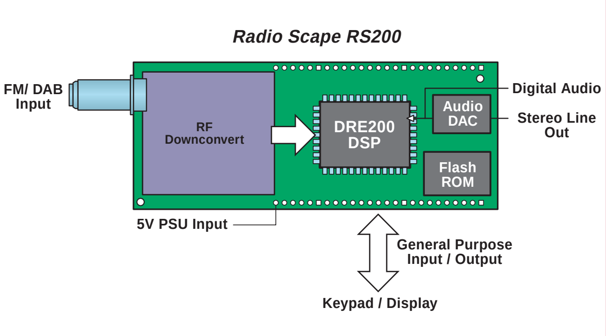
Figure 4. Compact DAB receivers for the 'German' L band are available at less than 200 euros (www.thiecom.de). The receiver on the right can also receive VHF broadcasts.

DAB inside

If you look for components for DAB receivers, you will quickly find two British manufacturers: FrontierSilicon (www.frontier-silicon.com) and RadioScape (www.radioscape.com). FrontierSilicon's product line is based on the Chorus FS1010. This IC is a highly integrated multimedia processor with ADC input, a DSP processor core, DAB coprocessors, on-chip RAM and cache memory, and a wealth of on-board peripheral. The DAC is not integrated, so users are free to spend as much as they wish on this component (or as little as they wish, if cost is an objective). For equipment manufacturers, FrontierSilicon also provides convenience products in the form of complete modules that include the RF front end (tuner) and several peripheral components. To produce a complete receiver, the manufacturer only has to add his own user interface (control processor, display and buttons), audio portion (DAC, buffer, sockets or Toslink, etc.), and an enclosure.

RadioScape goes a step further with its tiny RS200 Module Board, which uses the Texas Instruments DRE200 DAB IC and incorporates all of the functions of a DAB/FM digital radio. As you can see from the illustration, a complete DAB/FM tuner can be made by simply adding a few pushbuttons, a rotary encoder, a standard LCD module (2 × 20 characters) and a power supply. With its compact dimensions, the RadioScape module can also be used to build pocket radios.

It's certainly not much of a secret that most DAB receivers are fitted with such modules. As an example, the photos show what's inside the DAB tuner from Restek's Audio Mini Module series (www.restek.de).



Almost plug-and-play: the RadioScape RS200 DAB/FM tuner module (www.radioscape.com).

The module used in the DAB tuner in Restek's Audio Mini Module series.

lands, regular DAB operation was only started on 27 February 2004 after a five-year test phase, which surprisingly made the Netherlands the last of the pre-expansion EC countries to introduce regular DAB service. There as well, availability is concentrated in regions with high population density, and according to official statements, approximately 40 percent of the population is currently covered.

All of these countries have in common that the number of receivers sold lags behind the technical investments in the transmitting network. This may in part be due to the fact that in the beginning, relatively small markets are not especially attractive for large manufacturers.

The receiver market

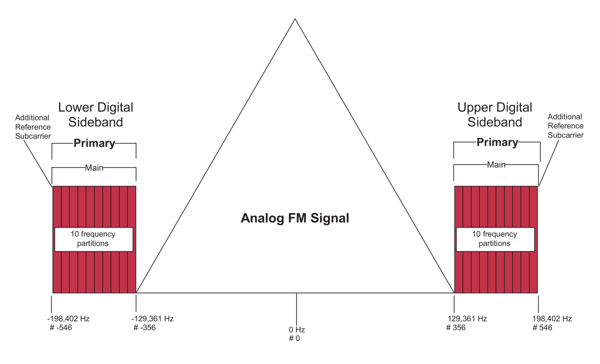
The end-user market is divided into four major segments. The first of these is car radios, which in Germany was initially regarded as the most important market segment. Prices in this segment are relatively stable. The market leader, Blaupunkt, offers its Woodstock 53 (!) model for 579 euros. The Grundig Allixx is somewhat less expensive at 399 euros. Prices do not vary much from one country to the next. Only the UK is again slightly ahead of the curve, with a model (Goodmans) available for less than 200 pounds.

The situation with mobile and portable receivers is different. In the UK, the market is dominated by small, inexpensive receivers that can only receive Band III. Portable receivers are available starting at around 70 pounds. By contrast, prices in Germany maintained a lower limit of approximately 200 euros until recently. This situation changed at the CeBIT exhibition, where TechniSat presented a pair of lower-priced receivers: the DAB-Man for 169.99 euros and, for home use, the Digit-Radio DAB for 159.99 euros. Visitors to the CeBIT could also admire the first combined DAB/DRM receiver, the Starwaves Prelude. This receiver, which is made by a small manufacturer in Hanover, will not become commercially available until late this year. The price is said to be 'in the high three-figure' euro range.

In Germany, DAB tuners for hi-fi systems are still the domain of the high-end manufacturers, such as Restek

Things are different in the USA:

HD radio instead of DAB



The hybrid HD Radio signal consists of a frequency-modulated main carrier (for FM programmes) and digitally modulated sidebands for HD Radio.

The DAB article in the April 1998 issue of Elektor Electronics reported that ‘in the USA, the National Association of Broadcasters (NAB) opposes the introduction of DAB and has come out in favour of In-Band Digital Radio for operation in the VHF and medium-wave bands’. At that time, no practical method had been found to implement such a solution. The situation has changed since then: under the name ‘HD Radio’, iBiquity Digital Corporation (www.ibiquity.com) developed a technique that allows digital programmes to be broadcast on existing AM and FM frequencies using existing transmitters. This can be done in combination with conventional AM and FM programmes, which can continue to be broadcast on the same frequencies. All that is necessary to enjoy the improved sound quality and data services of HD Radio is to buy a new receiver with HD Radio capability. CD quality can be achieved with FM reception, while AM programmes have the same quality as current FM broadcasts. In both cases, noise-free reception is provided along with supplemental data functions. Most HD Radio receivers can also receive normal AM and FM broadcasts.

Before even a single receiver was commercially available, iBiquity managed to grant licenses to more than 280 radio stations in 37 US states. Component manufacturers, such as Alps (front-end tuners, A/D and D/A converters, and signal processors) and Philips (SAF3350 HD Radio Processor) plan to start mass production this year.

(www.restek.de). Particularly demanding listeners can spend as much as 2700 euros for such a DAB tuner, while in the UK an Acoustic Solutions DAB/FM tuner for stereo systems can be obtained for as little as 115 pounds. Computer-based DAB radios, by contrast, are scarce. The only model available in all countries is the TerraTec DR Box 1 (300 euros or about 210 pounds).

Summaries of available equipment and prices can easily be found on the Internet, such as at www.digitalradio.de for Germany and www.digitalradionow.com for the UK.

What about the future?

In Germany, DAB has been pronounced dead once already. Presently, the situation can be regarded as being more positive. It appears that prices could again drop in the near future: the Anglo-Israeli company Sonarics is offering their CSM DAB module for US$ 25, and the Analog Devices Blackfin DSP, which allows DAB functionality to be implemented in software, is available at 5 dollars in large quantities. At last, the large manufacturers (in particular Sony) are indicating their willingness to enter the market. In parallel with this, promotional efforts are being increased and coordinated under the direction of Initiative Marketing Digital Radio (IMDR). In any case, in Germany hopes are now being pinned on a ‘soft transition’ instead of a ‘breakthrough’. The demand that VHF radio broadcasting simply be stopped by 2015 (or even earlier) has now been dropped.

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